STUDIES ON THE ECO-BIOLOGY OF THE *UPENEID* SPECIES FROM THE COASTAL WATERS OF VISAKHAPATNAM

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In recent years, the terrestrial, aquatic and atmospheric environments are put to an immense stress due to increased human activities. Aquatic environment provides numerous resources that support human life in different ways. Organisms of all the trophic levels are available in aquatic Ecosystem. Out of the entire aquatic organisms that are used as a food, man is interested in the tertiary production, fish in particular, for several reasons. Fish are an important part of a healthy diet since they are considered to be an excellent source of high value protein and essential nutrients. In addition to protein, fish contains carbohydrate, vitamins A and D, iron, calcium and other minerals. Fish are an important resource for humans worldwide, especially as food. Commercial and subsistence fishery, both from wild habitats and cultivated farms is being widely practiced. Fish are also caught by recreational fishers, kept as pets, raised by fish keepers, and exhibited in public aquaria. Fish have had a role in culture through the ages, serving as deities, religious symbols, and as the subjects of art, books and movies. In low income food deficient countries (LIFDCS) fish forms 22% of animal protein consumption. Oil rich fish such as salmon, mackerel, herring, tuna, trout and sardines are all rich in omega-3 fatty acids, which help to reduce the risk of developing cardiovascular diseases.

Modern fisheries science has emerged as a result of a very beautiful blending of many basic sciences such as biology, ecology, hydrology, meteorology, pathology, economics, commerce etc. The common aim of all these sciences is to project the fish as food for human kind. This need was felt only in the last few decades of the nineteenth century when we started understanding our limitations in the exploitation of the available natural fish resources. Keeping in view the pressure of unemployment currently faced by many countries of the world, fishery can play an important role in the rural economy. It can provide immense job-potential to unskilled rural population. Indian fisheries sector today provides employment to over 11 million people, directly or indirectly. Another great role is in the alleviation of the suffering of the malnutrition among the poor countries of the world. Fisheries can play an important role in this case as well.

The marine environment in the state, which has a long coastal line, includes both the coastal zones (terrestrial) as well as the seas of Bay of Bengal. The Bay of Bengal is full of biological diversity, diverging amongst coral reefs, estuaries, fish spawning and nursery areas and mangroves. It is located on the northeastern part of the Indian Ocean. It resembles a triangle in shape, and is bordered by Bangladesh and the Indian state of West Bengal to the north India and Srilanka to the West and Myanmar and the Andaman and Nicobar Islands to the east. The Bay of Bengal receives inflow from many large rivers, namely the Ganges, Brahmaputra, Meghna, Mahanadi, Godavari, Krishna and Cauvery, often passing through large cities before getting discharged into the Bay. Fisheries are the major socio-economic importance to all countries bordering the Bay of Bengal, as the industry provides direct

employment to over two million fishermen. The main commercial fish species are tuna, shrimp, yellowfin, goatfish.

The fishes of the family Mullidae, occurring widely in tropical, sub tropical and temperate habitats from the upper littoral down to the upper slope of coastal regions are popularly called as goat fishes. These are most associated with the reefs of the Atlantic, Indian and Pacific Oceans. They are sometimes called as red mullets. Within the family are approximately six genera and 55 species.

These Mullets contribute to an important demersal fishery in Visakhapatnam fishing harbour. Goatfishes clearly deserve more attention in future costal habitat exploration, monitoring and management efforts. Eco-biology is the study of the relationships of organisms to their natural environment and the impact of the same on their biology. It should always be kept in mind that in Fishery science Eco-biology of an organism is a very important aspect to understand the fishery potential of the same in any habitat. Keeping the above mentioned fact in mind the present study has been carried out on two commercially important species of Upeneids i.e., *Upeneus vittatus* and *Upeneus moluccensis*, which from a considerable component of the regular Fish catch from the coastal waters of Visakhapatnam. The results of the study based on two years data, have been thoroughly analyzed and then compiled to present the same in the form of a thesis consisting of five chapters.

The details of physiography and physicochemical qualities of the coastal waters of the Outer Harbor area have been presented in **Chapter–I** with relevant figures, statistical treatment and necessary discussion.

The selectivity, intensity, preferences, differences and seasonal variations together with the possible reasons for the variation in food and feeding habits of *Upeneus vittatus* and *Upeneus moluccensis* have been given in **Chapter–II** along with necessary tables and figures.

Chapter–III deals with growth and age of the two species, wherein the length-weight relationship and condition factor of the fish were also incorporated together with necessary statistical treatment and discussion.

Chapter–IV deals with the breeding biology of the two species under study, wherein the details of the maturity stages, size at first maturity, sex ratio and breeding cycle have been given substantiated with necessary statistical treatment and discussion.

Chapter–V deals with the variations in the biochemical constituents like, proteins, carbohydrates and lipids within the two species in relation to the size and season along with necessary discussion.

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